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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,665	12/18/2001	Kameran Azadet	15-7	1787

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Ryan, Mason & Lewis, LLP
1300 Post Road, Suite 205
Fairfield, CT 06430

EXAMINER

TORRES, JOSEPH D

ART UNIT	PAPER NUMBER
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2133

DATE MAILED: 12/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/022,665

Applicant(s)

AZADET ET AL.

Examiner

Joseph D. Torres

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 9, 10 and 21-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 9, 10 and 21-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/14/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. See the Non-Final Action filed 07/28/2004 for detailed action of prior objections. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites, "multidimensional code symbols are transmitted over more than one symbol interval associated with one of said symbol components". The term "associated with" is indefinite since it does not specify how the "symbol interval" is related to the "symbol components".

Claim 24 recites, "calculating a combined metric by combining said metric for said initial symbol component and said metric for said subsequent symbol component" [Emphasis Added]. It is not clear which metric, "said metric" refers to.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. Claims 1-4, 9, 10 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eyuboglu; Vedat M. (US 4713829 A) in view of Kim; Young-Sang (US 5963592 A).

35 U.S.C. 103(a) rejection of claims 1 and 21.

Eyuboglu teaches compensating for intersymbol interference caused by previously decoded multidimensional code symbols (Column 8 and 4D Block Encoder 97 in Figure

7 of Eyuboglu teach 4D coded information mapped onto a 4D constellation; the 4D constellation is a multidimensional code symbol; col. 16, lines 20-24 Eyuboglu teach that a DFE can be used in place of the Linear Equalizer 44 in Figure 4 of Eyuboglu; col. 2, lines 1-8 in Eyuboglu teach that a DFE compensates for intersymbol interference caused by previously decoded multidimensional code symbols; also col. 4, lines 61-65 in Eyuboglu teaches a preferred embodiment using a noise predictor for compensating for intersymbol interference caused by previously decoded multidimensional code symbols by offsetting received signals by a noise prediction value that is based on prior received signals); and compensating for intrasymbol interference caused by symbol components within a current multidimensional code symbol (the Examiner asserts that intersymbol interference, intrasymbol interference, fading, etc. are types of noise in a communication channel that cause errors and the Viterbi Detector 48 in Figure 4 of Eyuboglu is an error correction device for convolutionally encoded signals; any error correction device compensates for noise such as intersymbol interference, intrasymbol interference, fading, etc. by correcting errors due to the particular noise). Note: col. 6, lines 15-16 in Eyuboglu teaches a modulator for providing in-phase and quadrature coordinates.

However Eyuboglu does not explicitly teach the specific use of taking specific compensatory actions designed specifically for intrasymbol interference.

Kim, in an analogous art, teaches use of taking specific compensatory actions designed specifically for intrasymbol interference (col. 9, lines 8-13 in Kim teach taking the

specific compensatory actions designed specifically for intrasymbol interference of “updating the in-phase and quadrature phase filtering coefficients”).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Eyuboglu with the teachings of Kim by including use of taking specific compensatory actions designed specifically for intrasymbol interference. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of taking specific compensatory actions designed specifically for intrasymbol interference would have provided adaptation for abrupt changes in the channel environment (col. 3, lines 1-5 in Kim).

35 U.S.C. 103(a) rejection of claim 2.

Column 8 and 4D Block Encoder 97 in Figure 7 of Eyuboglu teach 4D coded information mapped onto a 4D constellation. A 4D constellation must be transmitted over more than one transmission frame or interval.

35 U.S.C. 103(a) rejection of claim 3.

Col. 6, lines 15-16 in Eyuboglu teaches a modulator for providing in-phase I and quadrature Q coordinates or channels. Column 8 and 4D Block Encoder 97 in Figure 7 of Eyuboglu teach 4D coded information mapped onto a 4D constellation.

35 U.S.C. 103(a) rejection of claim 4.

Eyuboglu teaches calculating intersymbol interference estimates based on said previously decoded multidimensional code symbols (col. 4, lines 61-65 in Eyuboglu teaches a preferred embodiment using a noise predictor for compensating for intersymbol interference caused by previously decoded multidimensional code symbols by offsetting received signals by a calculated noise prediction value that is based on prior received signals; a calculated noise prediction value is an intersymbol interference estimate based on prior received signals); calculating intrasymbol interference estimates based on possible data symbol values (col. 9, lines 8-13 in Kim teach taking the specific compensatory actions designed specifically for intrasymbol interference of “updating the in-phase and quadrature phase filtering coefficients”; updated in-phase and quadrature phase filtering coefficients are intrasymbol interference estimates based on possible data symbol values); and calculating branch metrics based on a received signal and said intersymbol interference and intrasymbol interference estimates (col. 3, lines 1-2 in Eyuboglu teach that branch metrics are calculated based on a received signal and said intersymbol interference and since the Viterbi detector 48 in Figure 4 of Eyuboglu receives input from Equalizer 44 the input of the Viterbi detector is based on intrasymbol interference estimates of the Equalizer; hence the branch metrics calculated from the input to Viterbi detector 48 are also based on intrasymbol interference estimates of the Equalizer).

35 U.S.C. 103(a) rejection of claim 9.

Col. 10, lines 20-26 in Eyuboglu. Note: the estimated path is the surviving path.

35 U.S.C. 103(a) rejection of claim 10.

Col. 3, lines 56-61 in Eyuboglu.

35 U.S.C. 103(a) rejection of claim 22.

Predictor coefficients b_{new} in col. 11, lines 19-65 in Eyuboglu are metrics used in the calculation of 2D branch metrics (col. 12, lines 1-10 in Eyuboglu) using previous surviving received signals $r_{1,\text{old}}$ and $r_{2,\text{old}}$.

Col. 11, lines 19-65 in Eyuboglu teaches calculating a Predictor coefficient metric for an initial symbol component using previous survivor symbols $r_{1,\text{old}}$ and $r_{2,\text{old}}$ from a corresponding state to account for intersymbol interference, wherein said metric is ultimately used for the calculation of a branch metric (col. 12, lines 1-10 in Eyuboglu).

35 U.S.C. 103(a) rejection of claim 23.

Eyuboglu teaches calculating a metric for an subsequent symbol component $r'_{1,\text{new}}$ and $r'_{2,\text{new}}$ using survivor symbols received signals $r_{1,\text{old}}$ and $r_{2,\text{old}}$ from a corresponding state to account for intersymbol interference and using at least one data estimate $r_{1,\text{new}}$ and $r_{2,\text{new}}$ to account for intrasymbol interference

35 U.S.C. 103(a) rejection of claim 24.

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Eyuboglu teaches calculating a combined 2D branch metric by combining said metric b_{old} for said initial symbol component (col. 11, lines 45-46 in Eyuboglu) and said metric b_{new} for said subsequent symbol component (col. 11, lines 60-68 in Eyuboglu).

35 U.S.C. 103(a) rejection of claim 25.

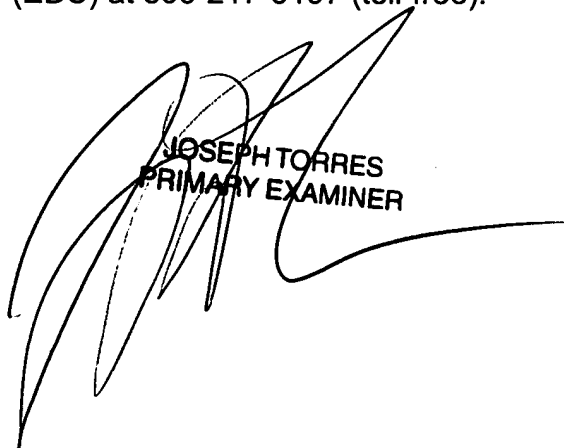
Eyuboglu teaches computing a 4D branch metric for a transition in a multidimensional trellis using said combined 2D branch metric (col. 12, lines 30-31 in Eyuboglu).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



JOSEPH TORRES
PRIMARY EXAMINER

Joseph D. Torres, PhD
Primary Examiner
Art Unit 2133